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NASAL INSUFFICIENCY

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The Surgical Treatment of Some Common Forms of Nasal Insufficiency.

BY

L. H. PEGLER, M.D.,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND; SURGEON TO THE METROPOLITAN EAR,
NOSE AND THROAT HOSPITAL; MEMBER OF AND CURATOR TO THE LARYNGOLOGICAL SOCIETY
OF LONDON; MEMBER OF THE OTOLOGICAL SOCIETY OF THE UNITED KINGDOM,
ETC., ETC.

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THE SURGICAL TREATMENT OF SOME COMMON FORMS OF NASAL INSUFFICIENCY.

By L. H. PEGLER, M.D.

It will be advisable, in the first place, to clear the ground by explaining what should be understood by "nasal insufficiency." By this term is implied a continuous or intermittent inability to breathe satisfactorily through the nose, varying in degree from a comparatively slight inconvenience to anything short of actual obstruction. In an attenuated form this symptom is almost purely subjective; but it is objective also in pronounced degrees, and is in direct association with a diminished sum-total of nasally respired air, whether the impediments to respiration be bilaterally distributed or confined to one chamber. If the insufficiency is unilateral, it may be so liberally compensated by proportionate increase in magnitude of the companion chamber as almost to preclude the patient's perception of his defect; but this abrogates nothing from its importance. Not only will he be unable to clear and ventilate the obstructed passage, but sooner or later he may be the subject of some catarrhal process in one or other of the ramifications of the upper respiratory tract, of partial loss of the sense of smell, of polypus formation, or of some inflammatory or suppurative disease posterior to the obstruction.

Definition
of Nasal
Insuffici-
ency.

Further, the variableness of the personal equation is such that the term "insufficiency" must be to a certain extent a relative one, since an air-current voluminous enough in one person's case might be so inadequate as to cause considerable discomfort to another. As regards the periodicity of the defect, a nose that, performing properly through the day—making allowance for slight catarrhal or reflex turgescence that must occasionally occur—is so

habitually impeded in the recumbent posture at night as to have then occasioned mouth-breathing, and consequently a dry mouth in the morning, may be fairly considered incompetent and in a quasi-pathological condition.

Lastly, I understand this term to apply to states depending upon an exaggeration or deformity of anatomical features, as opposed to those resulting from morbid processes in the nose, or of obstructive agents of any kind in the naso-pharynx; hence I conceive "nasal insufficiency," in the language of the rhinologist, to be distinct from absolute and permanent stenosis—such as one meets with, for instance, in valvular closure of the posterior choanæ by actual tumours of the naso-pharynx. In fact, owing to the ever-varying contraction and dilatation of the erectile tissue in the mucous surfaces of the nasal chambers, problematically alternating from one side to the other, there can hardly ever be *continuous* obstruction from such causes as I am here concerned with.

It is singular that there should be any divergence of opinion amongst laryngologists as to the importance to the human economy of free, well-drained, and properly-ventilated nasal cavities. I have heard this essential endowment described as a luxury; but surely it ought not to be so regarded. We must all have observed how frequently a patient partially relieved of nasal obstruction by operation returns to the surgeon subsequently with the request that every vestige of the hindrance to his breathing may be removed. Many people continue a whole lifetime nasally insufficient, breathing through open mouth, and advertising their condition by the complete absence of nasal resonance in their voices, entirely through an exaggerated fear of an operation and of the suffering it is supposed to entail; in this belief they are too often encouraged by their lay and professional advisers, who are uninformed as to the nature and details of the operation required. It is remarkable, on the other hand, what an intense degree of mental disturbance and nervous erethism are sometimes set up and maintained by really slight forms of nasal insufficiency in neurotic individuals. This phenomenon has been described as "nose on the brain"; and it seems to bear some analogy to the common neurotic pharynx. Such an example as the following has probably occurred in the practice of every rhinologist some time or other:

An elderly gentleman had been in the habit of taking snuff during the earlier part of his career, and probably from this cause an irritable condition of the nasal mucous membrane had gradually become established. Someone had prescribed him an ointment

Distinction of Insufficiency from Complete Nasal Obstruction.

Nasal Insufficiency a Source of Nervous Erethism.

Case.

containing cocaine with carbolic acid, which only aggravated the mischief, since the temporary relief derived from its use had resulted in his making too free with it. This unhealthy condition of the nasal mucous membrane, superadded to a slight degree of obstruction, combined to create a state of things that reacted upon the patient's mind, and rendered his nose the veritable bane of his

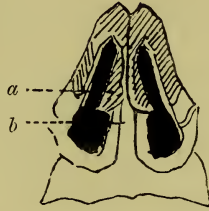


FIG. 1.—ANATOMY OF THE VESTIBULES.

a, The mesial crus of the right lower lateral cartilage ; *b*, the triangular cartilage of the septum.

existence. He gave up his house, his club, his correspondence, and almost all social engagements. So great was his aversion to lying in bed and breathing through his mouth, that he frequently passed the whole night in his chair, and he rarely went to bed till five or six o'clock in the morning. I found in this case a spur in



FIG. 2.—RIGHT LOWER LATERAL CARTILAGE SEEN IN PROFILE.

a, The mesial crus in the vestibule.

the right chamber and some flabby tumefaction of the mucous membrane in the left ; both chambers were rather narrow, the nose being of the aquiline type. When these slight defects were remedied and the nose cleared up, this gentleman's health improved rapidly ; he became practically a new man, and I still hear a good account of him from time to time.

In approaching the consideration of the causative factors of

Three
Forms of
Vestibular
Insuffici-
ency asso-
ciated
with the
Outer
Wall.

nasal insufficiency, and commencing with the *vestibules* (see Figs. 1 and 2), we are confronted by the fact that certain of them give rise to conditions which admit of radical cure, whilst others, according to our present knowledge, are capable of amelioration by passive or active dilatation (divulsion), but that is all. This relates especially to stenosis referable to the external wall of the vestibule, and includes the following: (1) congenital smallness of the anterior nares; (2) collapse of the *alæ nasi* with or without tumidity; (3) constriction of the passage leading from the vestibule into the nasal chamber proper. This entrance, the *limen vestibuli*, is sometimes reduced to a narrow chink or fissure, of which the outer margin is formed by a prominent fold, marking the posterior confines of the vestibule, to which Roughton has drawn attention, and the inner by the septum (Fig. 3). It is a condition that is often associated with alar collapse, and betokened by a well-marked external dimple. It may constitute the sole source of an insuffi-

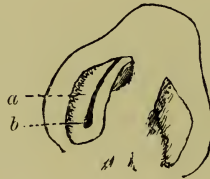


FIG. 3.—CONSTRICTION OF THE LIMEN VESTIBULI BY ROUGHTON'S BAND.
a, The band; *b*, the limen. (Compare Fig. 7.)

Diagnosis
and Treat-
ment.

ciency, or may remain as a cause of failure after the eradication of intranasal obstruction. In order to successfully diagnose these forms of stenosis, the nasal speculum should not be inserted deeply, and should be only moderately expanded. Hill, who has devoted much attention to this subject, informs me that for the treatment of constriction of the *limen* he has tried divulsion with and without section of Roughton's band, but without success; and finds that mechanical dilatation by means of a short piece of drainage-tubing, a small rubber umbrella ring, or a celluloid expander, is the best means of keeping the passage patent. I can fully corroborate this experience, which applies equally to simple alar collapse; the above dilating agents afford much relief to obstructed nasal breathing during the night, if worn at this period, but, of course, are in no sense curative.

I pass next to the discussion of those forms of encroachment upon the vestibular area resulting from abnormalities of the internal or *septal* wall. These depend, so far as my observation goes,

upon (1) displacement outwards, or eversion, of the lower border of the triangular cartilage; (2) dislocation outwards of the *mesial crus* of the lower lateral cartilage in the *columna nasi* (*septum mobile*); (3) these two displacements in combination. All three may occasion varying degrees of encroachment, from slight to severe, and all commonly give rise to a sigmoid distortion of the *columna*. Displacement of the lower border of the triangular cartilage is, I believe, the most frequently met with. In this lesion the everted segment often gives the feeling of being loose or detached from the main body of the cartilage, but though thinned perhaps at the bend, and consequently somewhat mobile, I have never found it free in operating for its removal, as Bosworth has observed; hence unless the *mesial crus* is implied by the term, I am not acquainted with any structure that on anatomical or clinical grounds could be designated the "columnar cartilage," a term which, moreover, is not recognised by Quain. Excepting in

Three
Forms in
Associa-
tion with
the Inner
Wall.

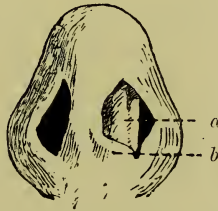


FIG. 4.—DISPLACEMENT OF LOWER BORDER OF TRIANGULAR CARTILAGE INTO LEFT VESTIBULE.

a, Cartilage; *b*, distorted margin of *columnna*.

trifling examples, these defects are of considerable importance; they may reduce the nostril to a mere slit, which practically closes altogether on taking a full breath, and the disfigurement they cause is unquestionable. Their elimination is a little troublesome, but the result fully repays all the pains we may bestow upon it. The first step should be to ascertain whether the triangular cartilage or the *mesial crus* of the lower lateral cartilage is constituting the lesion, and whether in this case the former is playing a subsidiary part. If the lower border of the triangular cartilage is the sole offender, it will betray itself by longitudinally bisecting the nostril as a thin white line (Fig. 4), but if, though actually everted, it is obscured by an overlying, displaced, and prominent *mesial crus*, the degree to which it participates must be demonstrated by diverting the tip of the nose towards the sound side, as shown in Fig. 5.

Differen-
tial Diag-
nosis.

The operative details vary with the diagnosis. If the protruding

body is the everted lower border of the triangular cartilage of the septum, the assistant must first project it by diverting the tip of the nose as described, and keeping it in that position. The cartilage is then exposed by an incision along the thin white line and extending its entire length from the rounded extremity in front, where it is partially concealed in the "ventricle of the vestibule,"

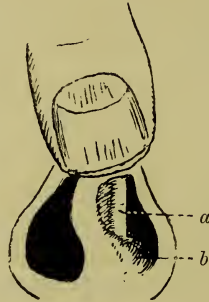


FIG. 5.—DISLOCATION OF MESIAL CRUS, WITH EVERSION OF THE TRIANGULAR CARTILAGE (DISPLAYED BY LATERAL PRESSURE).

a, Triangular cartilage; *b*, mesial crus.

to its posterior attachment to the anterior nasal spine. Two little flaps of integument are then dissected up till the cartilage is sufficiently denuded for the whole of the everted portion to be excised. The best knife to use is a fine, probe-pointed, straight blade, like a Smith's knife for cleft palate. Two pairs of small scissors, one having an angle in the blades, and the other in the



FIG. 6.—DISLOCATION OF THE MESIAL CRUS (*a*) IN THE LEFT VESTIBULE.

shank, are also indispensable for neat work. When the flaps come together we must judge if any trimming is required, and whether, too, the mesial crus should be removed; sutures are not necessary.

For a dislocated mesial crus (see Fig. 6) the assistant *depresses* the tip of the nose, and the surgeon makes his incision over the prominence in the columna nasi, parallel with its lower border, but, for æsthetic reasons, not too low. Two flaps are separated as before, and the crus seized by a pair of Bozemann's long tenaculum forceps and stripped out of its bed in the columna as far forward as its

junction with the outer limb in the ventricle, where it is snipped off with curved scissors. If the septal cartilage participates in the displacement, as it usually does, it must be projected in the manner already mentioned, and its lower edge shaved freely off to whatever extent may seem necessary in order to match the opposite nostril. One is more likely to remove too little than too much, but care must be taken to obtain a smooth border without perforating the columna or injuring the flaps. The latter will generally bear some pruning, especially the lower one, in which case this should be done, otherwise the final appearance may be a little disappointing. All that is then required is a painting of collodion, but if in addition a little pledget of gauze, and after that a celluloid dilator, is worn for a short time, the nostril will take a better shape, and no trace of the scar will remain. I have performed these operations repeatedly under cocaine, the patient lying on an operating table, but they are painful unless the local anæsthetic is applied very thoroughly

Applica-
tion of the
Local
Anæ-
sthetic.

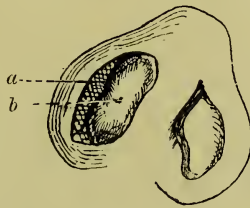


FIG. 7.—LIMEN REDUCED TO A FISSURE BY A SEPTAL DEFLECTION WITHIN THE VESTIBULE.

a, The limen ; *b*, septum. The higher the flexure within this limitation, the less do we see of the everted border in the opposite nostril.

and systematically. The initial incision may be rendered painless by injecting $\frac{1}{6}$ grain cocaine in freshly-made solution hypodermically into the cellular layer of the columna between the skin and the cartilage. Afterwards, anæsthesia may be maintained by dabbing the freshened surface with pledgets of cotton-wool moistened with 10 per cent. cocaine solution. This, especially with the help of suprarenal capsule solution, effectually checks the bleeding, which is otherwise apt to be rather embarrassing.

We are often consulted for very severe forms of vestibular occlusion in which the obtruding object is constituted by a strong deflection of the entire anterior extremity of the triangular cartilage, the forepart of the receding nasal chamber sharing in the obstruction and presenting what is virtually a large spur about the situation of the limen. There is generally a clear history of a blow on the nose, and the whole organ is sometimes distorted towards the obstructed side. These cases admit of operation by

Treatment
of Vesti-
bular
Spur.

slicing off with a knife the much-thickened and deflected presenting cartilage; one or more strokes may be required, and the mucous membrane should be trimmed with scissors, but I have never found flaps necessary, though excellent authorities recommend them. A case restricted to the vestibule, but demanding this form of treatment, is shown in Fig. 7.



FIG. 8.—NORMAL OSSEOUS NASAL FOSSÆ: SLIGHT BONY HYPERTROPHY OF INFERIOR TURBINALS.

Intra-
nasal
Insuffici-
ency.

In studying the causes of nasal insufficiency located in the mucous chambers posterior to the vestibule, we find they are of such a nature as to admit of a classification of our cases into two main divisions:



FIG. 9.—NORMAL NASAL FOSSÆ STENOSED BY MUCOUS HYPERTROPHY (a) OF THE INFERIOR TURBINAL BODIES.

Insuffici-
ency in
Wide
Bony
Fossæ.

I. Those in which the osseous framework is of normal width or even slightly in excess of this, the obstructing elements consisting in a hypertrophic condition of the inferior turbinal or its mucous investment, or, in fact, of the mucous membrane of any portion of the air-way. (See Figs. 8 and 9.)

II. Those in which the osseous nasal fossæ are structurally

narrow (an independent source of insufficiency in itself), or, being narrowish, are rendered inefficient by slight or extensive departures from the normal in either wall, but almost invariably and of necessity in the septal (Fig. 10). These two classes, though clearly

Insuffici-
ency in
Narrow
Fossæ.



FIG. 10.—STRUCTURALLY CONTRACTED OSSEOUS FOSSE—SEPTUM DEFLECTED AND THICKENED.

distinguishable in the main, pass into each other by insensible gradations, so that no hard or fast line can be drawn between them.

There is also the very frequent unilateral or *mixed* case, in which the two conditions occur in the same individual, an encroachment upon one chamber by the septum giving rise to abnormal roominess in the opposite one, which in its turn is perhaps partly stenosed by compensatory hypertrophy of its inferior, or even middle turbinal, or both (Fig. 11, A, B).

Unilateral
or Mixed
Cases.



FIG. 11.—UNILATERAL INSUFFICIENCY.

A, Right cavity stenosed. Left, partially so. Septum vertically deflected to the right and thickened. *a*, Path of saw. B, Septum deflected without thickening; indication for partial right turbinotomy.

It has been questioned whether the bony structure of the inferior turbinal is ever truly hypertrophied, but I believe that it may be in both its osseous and mucous constituents under these circumstances. On the other hand, in the narrow class of nose this body is often correspondingly diminutive or ill-developed, and may be scarcely perceptible for the first half-inch or so from the vestibule, a fact which has an important bearing in reference to treatment.

Such a nose, whilst barely capable of performing its functions with the co-operation of that rare condition, a perfectly straight and flat septum, is rendered seriously stenotic by the slightest degree of thickening, spurring, or deviation of the latter, or by erectile tumefaction in the mucous investment of either chamber. Fortunately for the individual whose nasal organ is of this character, one of the two narrow chambers is usually rather less at fault than the other, since we rarely find both sides alike.

Treatment
in the
Roomy
class of
Cases.

The *treatment* of the roomy class of nose in a state of insufficiency practically resolves itself into that of so-called hypertrophic rhinitis in some form or another; it is one in which we are not usually confronted with much difficulty, and I only pause to insist that the surgeon should be careful not to err by doing too much; it is the broad and easy way! It was, I believe, for the treatment of this condition that Carmalt Jones invented his spokeshave; but it is just the one in which I never use the instrument myself, and, judging from past experience, I rather question the advisability in these cases of applying any cutting instrument to the turbinate body at all. One not infrequently hears a man boast nowadays that he scarcely ever uses the electro-cautery in a nose from one year's end to another, and without doubt this agent has been a great deal misused, but here is a condition in which I think it ought to find a legitimate application. The process of reduction by cauterisation is slow perhaps, and a patient may have to return three or four or more times at short intervals, seeing that some space must elapse before the lately-inflamed surface can be anæsthetised again with cocaine or its substitutes and the clearing up completed, but on the other hand, we have no troublesome granulations to get rid of, by subsequent cauterisations; the nervous patient is spared a great deal of mental perturbation by the bloodless character of the procedure, and I think the result is permanent if the searings have been thorough; I prefer to make them on the surface. If, on the other hand, partial turbinotomy is performed, to say nothing of complete ablation, there may follow when all is healed, a generally undesirable state of matters in cavern-like fossæ, closely resembling that described originally by Greville Macdonald under the title of "turbinal collapse," for which there seems to be no satisfactory and permanent remedy. It is of this, just as much as of the oft-spoken-of dry pharynx, that I have so much dread in my practice. Undoubtedly the snare may have to be requisitioned first in these cases, especially if there are terminal moriform hypertrophies, or if the whole length of the inferior turbinal is bordered with fimbriated hyperplasiæ, but such a case, being the termination of a

The
Electro-
Cautery.

Turbin-
otomy in-
advisable.

chronic inflammatory process, scarcely falls under my definition at the head of this paper.

The conclusion at which I have arrived is that, roughly speaking, if on applying cocaine the mucous tumefaction contracts up to such a degree as to enable one to see the naso-pharyngeal wall, no excision of tissue should be performed; but if the hypertrophy of the turbinal is mainly of bone, partial abscission of its anterior end may be advisable, though even then only to a limited extent. Cases bordering on the narrow class must be treated according to their own particular indications, keeping the above principle, however, always in view. In some a useful additional space can be gained by snipping off mucous membrane alone with very little bone included, the denuded part of the latter healing quickly enough in a healthy subject. If a considerable portion of bone has been excised, we have to take care that the proximal end is not too abruptly truncate, in which case an arch is formed which has been likened by Dundas Grant to a secondary septum, subdividing the chamber nearly to the floor. After the operated part

Treatment
of Inter-
mediate
Cases.



FIG. 12.—AUTHOR'S PROBE-POINTED KNIFE FOR SEPTUM OPERATIONS.
(Half natural size.)

has had time to settle down, it should be examined for this condition, and if necessary the lower free border tapered off with Grünwald's cutting forceps, otherwise subsequent trouble may arise from stagnation of the secretions; an expert operator will, however, attend to this point at the initial sitting.

Not infrequently in the roomy class, obstruction is augmented by hyperplasia of the erectile tissue of the floor of the meatus or of the septum, and I have had occasion to draw attention to the occurrence of what might be regarded as "septal tonsils," consisting of definitely shaped outgrowths of the *lymphoid elements* of the septal mucous membrane, projecting as tumours from near the free border of the vomer into the naso-pharynx. The erectile hyperplasiae usually occur in the region of the so-called "tubercle of the septum," a body which I think might much more aptly be designated the "cushion" or "pulvinus," to save confusion of terms, considering that, though not an anatomical constant, it is always, when present, a soft diffuse swelling, never partaking of the nature either of a nodule or a tubercle in character or appearance. All these protrusions are best shaved off with a sharp knife, such as that represented in Fig. 12, which I find useful for cutting

Septal
Hyper-
plasiae,
Lymphoid
and
Erectile.

Treat-
ment.

operations on the septum. In doing this it is very important not to leave an elevated border or crater-like surface, as adhesions afterwards bridge across from this to the opposite wall close to the receding anterior angle of the roof of the nose, where they are particularly troublesome to get rid of.

Treatment
of In-
sufficiency
in Con-
tracted
Nasal
Chambers.

Forcible
Dilatation
Obsolete.

Import-
ance of
diagnostic
Methods.

In entering upon the question how best to deal with the various factors of insufficiency in the *contracted nasal chamber*, I think we are met by one of the most difficult problems in nasal surgery; no two cases are ever seen alike, so that definite rules of treatment cannot be laid down, and a lengthened experience is our only reliable guide. There was a time, I believe, when great things were expected from the method of forcible dilatation of the inferior meatus—to judge from the manner in which the various patterns of dilating instruments were faithfully and persistently copied from one manual to another. I have no personal knowledge of this rough-and-ready treatment, which always appeared to me to be thoroughly unsurgical. But if the method were really commendable, no doubt it would be more in vogue; my impression is that the resiliency of both the septal and turbinal walls would insure their return to the old positions sooner or later. In direct opposition to this principle, and in every case in which an operation is contemplated, I advise a most painstaking preliminary examination of the nasal cavities to be undertaken. Such a course can alone engender an accurate and precise diagnosis, and dictate in a difficult or exceptional case a skilful and intelligent treatment.

Cocaine.

I may observe, in passing, that some care must be taken, in estimating an insufficiency, to make sure that these cavities are not largely tumefied by the continuance of a *catarrh*, in a subacute or chronic stage. When this is so, the catarrh must be reduced by simple detergent washes or sprays before the correct diagnosis of a permanent disability can be made. Cocaine, which to the rhinologist is as a mydriatic to the ophthalmic surgeon, is here indispensable whether tumefaction of the mucous membrane is present or not. I prefer De Havilland Hall's solution of 20 per cent. cocaine with 10 per cent. resorcin, applied in every instance on a pledget of cotton-wool, all superfluous fluid being squeezed out so as to avoid causing toxic symptoms in susceptible patients; the resorcin leaves a thin, whitish deposit on the mucous surface, but this is of no consequence. The various curves and deflections of the septum, in the horizontal, vertical, or oblique plane, the length and position of spurs or projections, whether buttress-like or sutural, hard or soft, must then be accurately determined,

together with the all-important point as to the presence of thickening or redundancy of the septal wall in addition to deflection. In making these investigations I use a long, blunt-pointed, bayonet-handled probe, straight, or slightly bent close to the tip (Fig. 13), and need hardly add that a brilliant illumination and well-elevated seat are essential adjuncts.

Value of
the Nasal
Probe.

These abnormalities of the septum, some of which are common enough to be oftener the rule than the exception, may give rise to very little inconvenience in a moderately roomy nose, and if sufficiently marked to require surgical interference, are in skilled hands easily dealt with. Given, however, a chamber with contracted walls, and the complexion of the case is at once altered, for new difficulties arise in precise ratio to the proximity of these structures. An attempt must be made to gain width, and we ask ourselves whether a choice is presented us as to which wall to attack. The narrower the chamber and smaller the nose in all proportions the less likely is the inferior turbinal to obtrude itself

The Problem of how
to gain
Space.

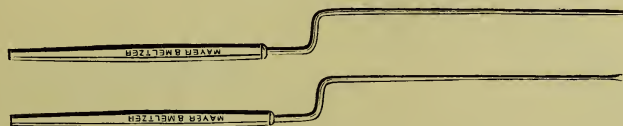


FIG. 13.—AUTHOR'S NASAL PROBE AND COTTON-WOOL APPLICATOR (LATTER NOT PROBE-ENDED BUT SLIGHTLY ROUGHENED AT EXTREMITY).
(One-third natural size.)

upon the meatal channel; in fact, it may be at least in the front part, as I have already observed, quite an inconspicuous object; but amongst the infinite variety of cases of insufficiency there is a very fair proportion in which to the practised eye it is clear that a reduction of this body will prove a ready means for acquiring the needed increment of space. Then the question arises, How much of it is to be taken off? Many surgeons perform complete turbinectomy as a routine without hesitation, and that expedient doubtless finds here its most legitimate application.

Reduction
of the
Outer
Wall.

Personally, except under special circumstances, mentioned below, I do not often remove the entire turbinal, and usually contrive to perform Lake's operation of anterior turbinotomy instead. Even in a cramped meatus the posterior two-thirds may prove to be considerably less contracted than the anterior, either owing to the turbinal tapering off normally towards its hinder end, or to a favourable curve being taken by the septum. Now, if this condition of the turbinal helps, when present, to render complete ablation doubtfully justifiable, so does it increase the difficulty of its

Turbinec-
tomy and
Turbin-
otomy.

Applica-
bility of
the Spoke-
shave.

performance. Unless the spokeshave is as sharp as possible, it will not engage the bone but scrape off the mucous membrane only, a result which is worse than useless unless very special means are taken to prevent synechiæ afterwards. Hill tells me that he frequently combines the two methods, using scissors first and meeting the incision so made with the spokeshave from behind. It is quite feasible to *saw* the inferior turbinate, but after sawing I have usually been compelled to *extract* with the spokeshave. Those who champion this latter instrument hold that, as a matter of fact, complete *turbinectomy* is rarely effected by it (which, if true, renders this term somewhat inaccurate), because a ledge of bone usually survives the knife more or less, from which a regrowth of mucous membrane ultimately springs, capable of functioning efficiently. I admit that there is much truth in this contention, and from my own investigations into the histology of the new tissue,

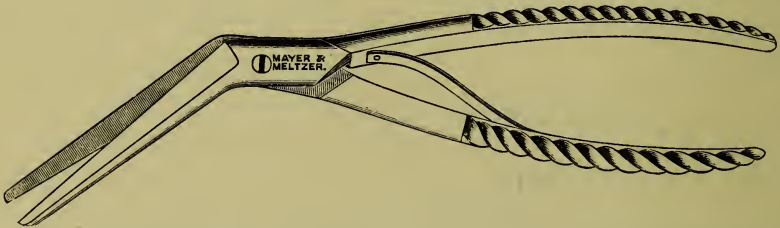


FIG. 14.—NASAL SHEARS FOR PARTIAL TURBINOTOMY. (Half natural size.)

A slight curve on the flat near the points is an acceptable modification when there is sufficient room in the nasal chamber to admit of its use.

concede that, given an inferior meatus for the most part hopelessly *contracted from outer wall to septum*, sufficient regeneration may take place to warrant the procedure, and the anticipation of a successful issue.

Partial
Anterior
Turbin-
otomy.

The success of Lake's operation of anterior turbinotomy depends very much upon the choice of instruments. Various forms of scissors are used and recommended by different surgeons, but nothing is more efficient and less likely to create disappointment than a pair of stout nasal shears (Fig. 14). In operating they should be pressed close up to the junction of the inferior turbinal with the outer wall, and an incision made not less than $\frac{3}{4}$ inch in length. When the turbinal thins away anteriorly, but approximates the septum an inch back in the meatus, the incision must be adapted to this circumstance. This incision should be the only one whenever possible, followed by the immediate encirclement of the semi-detached fragment by the snare, an attempt having been made to cut in obliquely with a view to a better shape

of the stump. It is important to engage the loose piece in the loop of the snare without delay, and before the seat of operation is obscured by the free bleeding that generally follows. The narrower the chamber the more difficult anterior turbinotomy becomes, especially in regard to the extraction of the fragment, and, of course, the less obliquity can be given to the incision. If free bleeding overtake us before the operation is completed, the chamber must be plugged with wool saturated with a thick solution of suprarenal capsule for a short time, after which the position of the loose piece can usually be ascertained. If for some reason the snare should not answer, Grünwald's invaluable conchotome must be our main dependence, and we proceed to remove the lost fragment piecemeal. When using the snare, the loop of wire (No. 6) must not be larger than necessary, it must be deftly applied, its farther extremity pointing outwards, and it must be pushed thoroughly home to the end of the incision before attempting to cut through. If suitable punch forceps are not available, or fail in his hands, the experienced operator will probably complete with the spokeshave, but on no account should an attempt be made to twist the piece off roughly with powerful forceps.

Details of
the Opera-
tion.

The second stage of the operation, as I am in the habit of performing it, consists in the insertion of a solid splint of soft rubber cut out of a square piece, and specially shaped to adapt it to the case in hand. This material was introduced a short time since, and is also a suggestion of Lake's. As soon as bleeding has been controlled, the splint may be introduced, and the case left until sufficient time has elapsed to allow of our judging as to the amount of space gained by the operation. The advantage of this indiarubber splinting is very great; it is absolutely non-absorbent and therefore aseptic, and it can be easily taken out, cleansed, and replaced by the patient as often as necessary. Its re-insertion is not painful if the operation to widen the meatus has been rendered adequate by excising a sufficient length and proportion of the inferior turbinal, otherwise the tension is considerable and will cause headache. When the splint fits properly, patients make no great objection to wearing it for a very considerable time, and one great recommendation for this practice is the certain prevention of adhesions, the opposed surfaces being thereby kept apart till quite healed. During insertion the splint must be kept strictly parallel to the floor of the meatus, and must be long enough to extend beyond its narrowest point.

The India-
rubber
Splint.

Under the gentle pressure thus occasioned, shreds of mucous membrane and little rough prominences become absorbed and

disappear, and a great deal of time and trouble in trimming up are saved during the after-treatment. If preferred, a moulded rubber splint can be obtained of definite form, shown in Fig. 15; these are supplied by the instrument makers in four different thicknesses, and by their means the width of the narrowest part of the meatus can be gauged. The thinnest and most serviceable splint is $\frac{1}{8}$ inch thick, or $3\frac{1}{2}$ mm.

If we have succeeded in clearing a better passage through a narrow chamber by sacrificing more or less of the inferior turbinal, a much fuller insight will be gained into the contour of the septum, and a better judgment formed as to the necessity or advisability of operating upon it. A bony spur situated at the ethmo-vomerine articulation, and which ere this may have been scarcely discernible save by its having barred the

The Inner
or Septal
Wall.



FIG. 15.—LAKE'S MOULDED INDIARUBBER SPLINT. (Two-thirds natural size.)

progress of a probe in that situation, can now perhaps be distinctly seen taking a bend outwards from the middle line, and presenting a whitish surface to the view. Such a spur would hinder nasal breathing seriously if growing on a dead level with the inferior meatus, but being usually formed by a projection from the ethmoidal plate, with (as in a specimen in my possession) or without a contribution from the superior border of the vomer, it is virtually above the path of the main air-current. I have occasionally sawn away all that could be got off from one of these pseudo-hyperostoses, but owing to their density the process is always a very tedious one. Another common abnormality, but one that rarely calls for interference as a cause of insufficiency, is a vertical deviation of the cartilaginous septum, which so approximates the lower border of the *middle* turbinal, like a lean-to roof, as to bridge over without hindering the respiratory current, though it may tend to block access of air to the olfactory region.

Question
of Resec-
tion.

Septal
Encroach-
ments Ne-
cessitating
Operation.

In a large remaining proportion of cases of insufficiency, it is recognised at a glance that the septal wall does encroach and must be dealt with accordingly; indeed, not only shall we find it creating insufficiency, but the tense and irritable mucous membrane investing it may also be a source of troublesome reflex neuroses. Moreover, it has happened to me, and doubtless to

other rhinologists, to find *mucous polypi* unexpectedly concealed behind a bulge in the septum, where for long enough they had been setting up catarrhal symptoms, headache, or deafness. Deflections that obstruct breathing are mainly of cartilage, and are situated anteriorly and therefore fairly within reach; they frequently merge into a spur or ledge, towards the base. If an insufficiency attributable to the septum is bilateral, the deviation is not likely to be extreme, and there is probably spur formation on both sides, or a good deal of thickening. Very strong deviations, as already indicated, are associated with unilateral insufficiency, and are not found in the contracted type of fossæ. A septum is described as "crumpled" when its outline is extremely irregular and embodies deflections in all three planes combined.

Forms of
Septal De-
flection.

Present-day operations for deformities of the septum may be roughly classified as follows: (1) Forcible straightening by fracture or comminution, on Adams' principle; (2) forcible straightening after incisions have been made through the cartilage, on Asch's principle; (3) cutting, sawing, and trephining operations. No. 1 may, I presume, be regarded as the parent of No. 2, which has been endlessly modified; the splint worn afterwards is a perforated, bent and hollow cone. Some surgeons combine the principles of Nos. 1 and 2 with No. 3, and use the saw or knife either before or after the crushing-forceps; but this course is not seldom forced upon them—in the one case owing to the redundancy of material, and in the other because adventitious spurs usually eventuate in the lines of fracture and, becoming sources of obstruction, subsequently require removal. I think we should select the form of operation at which experience has rendered us most adept; but, in my belief, the knife and saw, followed up by a judicious employment of the indiarubber splint, have a very large sphere of utility. We rarely meet with a case in which there is not sufficient redundancy of tissue in the deflected area to admit of a fair accession of space by a resection (see Fig. 11). Bosworth, who has always strongly advocated this method, and introduced his admirable saws for the purpose, describes it as "sawing out a new septum," and the organ being developmentally a double structure,* at least partially, it seems probable that we thus remove part of one of the two apposed but thickened walls; the glistening face often seen on the reverse side of the resected piece is perhaps thus explainable.

Treatment
of Deflec-
tions.

The Saw.

An extremely useful saw is that of Holbrook Curtis; its strong blade is just the right length, and it has the indispensable bayonet-

* Kölliker, A., "Zur Entwicklung des Auges und Geruchsorgannes menschlicher Embryonen." Würzburg, 1883.

angle in the shank. It is advisable in sawing to work from below upwards, using, of course, the lower blade. After starting well under the ledge at the base (if there is one), and directing it cautiously *in* at first, it should be carried rapidly upwards in the line of convexity, and not brought out too soon, or a hump will remain about opposite the middle meatus that would have been better away. In this manner we may excise obstructions in one or two fragments, amounting to upwards of $1\frac{1}{2}$ inches in length and $\frac{2}{3}$ of an inch in the vertical measurement. Even if muco-periosteum alone remains behind, it will be sufficient, for it will subsequently consolidate by deposition of new material. Perforating should be avoided, because—except perhaps in a very crumpled septum—it generally *can* be, especially if we throw a glance at the opposite side occasionally as we proceed. If a hole

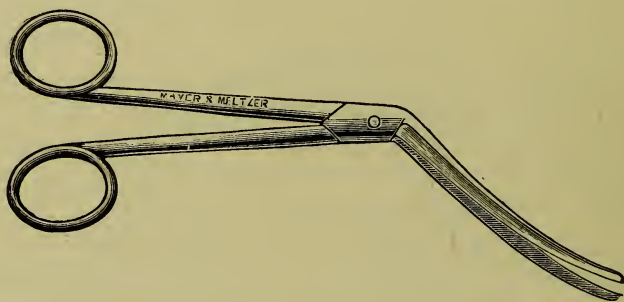


FIG. 16.—BECKMANN'S TURBINOTOMY SCISSORS. (Half natural size.)

has been made, the patient usually discovers it afterwards (if not too far from the nostril), in which event it should be explained to him that the contingency is not detrimental, and is often beneficial, if, indeed, not actually indispensable to, nasal respiration.

An artery, a branch of the naso-palatine (artery of the septum), sometimes spirts close to the anterior extremity of the wound; it can be avoided, I think, by not cutting too low, but when divided, the bleeding is a serious hindrance to a deliberate completion of the operation. Beckmann's turbinotomy scissors (Fig. 16) or Walsham's intra-nasal scissors (Fig. 17) are valuable for snipping septal mucous membrane, and are better finishing instruments than the spokeshave, often used for this purpose. In some instances no contrivance will trim the projecting edges of the gap in the septum so effectively as Grünwald's angular sinus forceps (Fig. 18). The sawing concluded, my main reliance is upon the flexible india-rubber splint, inserted either at the time or a day or two afterwards. All that has been said with reference to it in turbinal operations applies equally here. The great essential is the avoidance of

tension, especially in gouty and intolerant subjects, and the safeguard against it is a liberal operation.

The sigmoid curves in the horizontal line of the septum not infrequently account for the fact that behind a buttress spur or ledge obstructing in front, a second one may lie, harder in consistence and separated by an interval. If this posterior spur is not

Precautionary Measures.

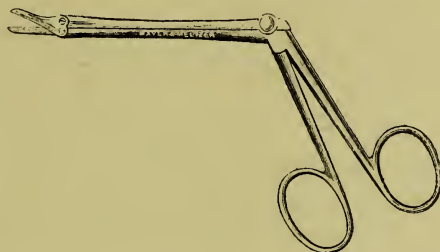


FIG. 17.—WALSHAM'S INTRA-NASAL SCISSORS. (Half natural size.)

cleanly sawn through, it marks a contracted spot in the meatus which the splint will pass tightly or with difficulty; now, on no account ought an incomplete operation to be propitiated by dilatation with a splint, at the cost to the patient of tension symptoms. Semon's thin celluloid adhesion preventers ($\frac{1}{2}$ to 1 m.m.) are very useful here, and should the patient refuse further operation, they

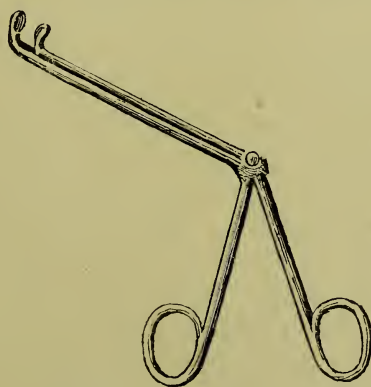


FIG. 18.—GRÜNWARD'S ANGULAR SINUS FORCEPS. (One-third natural size.)

will effectually prevent adhesions, and are easily borne. I am having a few made of the same material, increasing very gradually in thickness to 2 m.m. Do what we may, septum work alone in an extremely narrow nose is often apt to be unsatisfactory; the inferior turbinal is so close, that in the ablest hands it can scarcely escape injury by the saw, and rather than endeavour to patch up a tinkering operation, the wiser course perhaps is, by

Both Walls may have to be Resected.

one of the means already detailed, to remove or reduce it. This point is illustrated very well in Fig. 10.

Antiseptic
Precau-
tions.

The urgent necessity for aiming at strict asepsis in nasal operations cannot be over-estimated, for if this precaution be neglected, constitutional disturbance, tonsillitis and aural complications of a particularly troublesome character are liable to ensue. Iodoform (insufflated) is an excellent antiseptic, and better than any substitute as yet proposed. Cleansing sprays may be employed as soon as all bleeding has completely ceased. The gauze plug is better avoided, but if there is much tendency to hæmorrhage it cannot be dispensed with; in such a case finely-powdered tannin, hazeline, or suprarenal capsule, is valuable. Of primary importance is an early and effectual evacuation of the bowels; I order an effervescent granulated preparation consisting of sulphate of soda and citrate of potash in equal proportion, a cooling derivative which also helps to avert hæmorrhage.

Conclu-
sion.

In conclusion, I would remark that within reasonable limits the *age* of the patient is not preclusive in any of these nasal operations, especially with reference to the young. I have had occasion to perform turbinotomies, and remove synechiæ or spurs in children, and, as has been recently emphasized by Scanes Spicer (Ipswich, 1900), such means are often indispensable before the success of an adenoid operation can be properly utilised.

The foregoing observations are the embodiment of personal experience gained at my clinics at the Metropolitan Ear, Nose and Throat Hospital, and in private practice. They are presented with a full recognition of their meagreness in comparison with the breadth and significance of my subject, and with the wide area of the field that has lain before me. My aim has been to advocate the more artistic method, when an alternative one has been available, and I emphatically endorse the assertions of those who have exemplified how much may be done *secundum artem* to amplify an insufficient nasal breath-space under local anæsthesia. I have also desired, in conjunction with every true rhinologist, to recommend measures conducive to the physiological integrity of important organs whose task in our economy is one which no substitute can replace.

N.B.—Figs. 1 and 2 are reduced from Quain, 10th edition; Figs. 3 to 7 are from sketches made from actual cases by the author; Figs. 8 to 11 are chiefly modified from Zuckerkandl's sections, and are semi-diagrammatic. For most of the illustrations of instruments the author is indebted to Messrs. Mayer and Meltzer.

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